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INSTALLATION RESTORATION PROGRAM

AD-A231 685

Preliminary Assessment

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico;

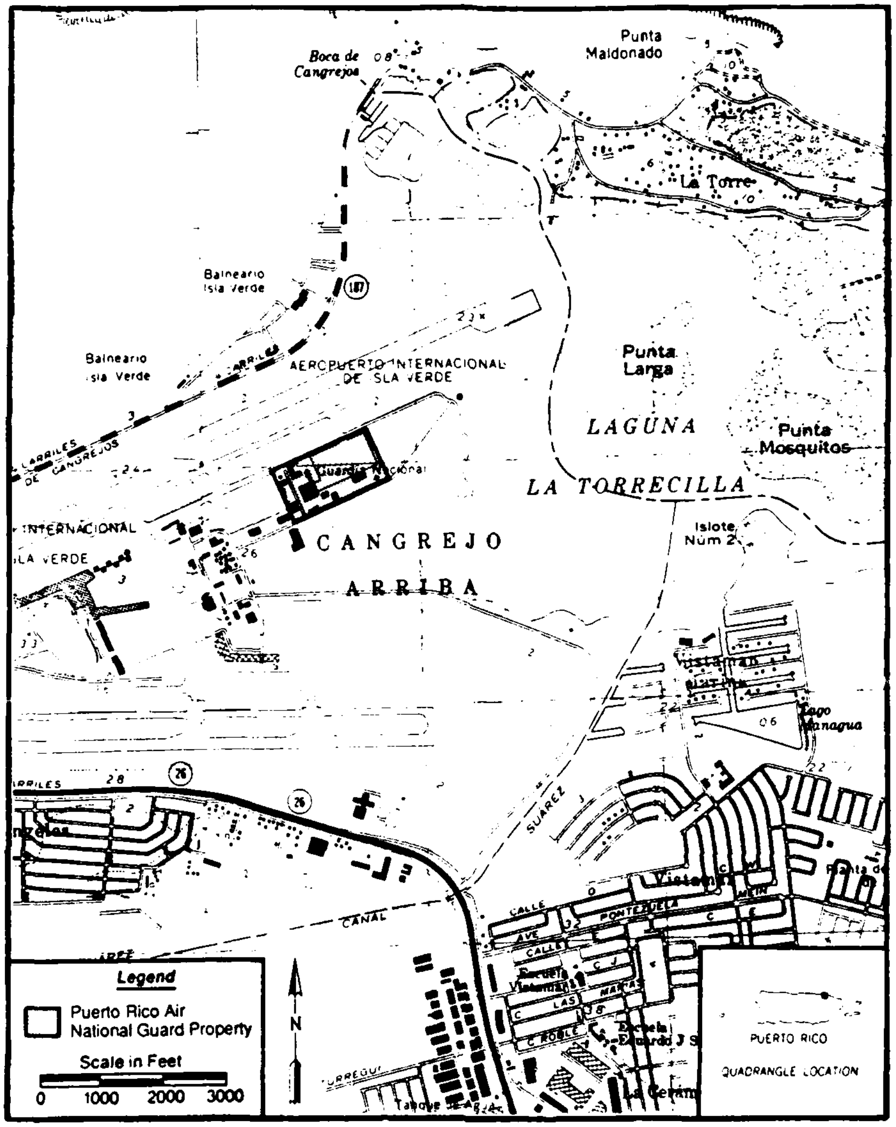
140th Aircraft Control and Warning Squadron
Puerto Rico Air National Guard
Toa Baja, Puerto Rico;

and

141st Aircraft Control and Warning Squadron
Puerto Rico Air National Guard
Aguadilla, Puerto Rico

Hazardous Materials Technical Center

October 1988



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PRELIMINARY ASSESSMENT

FOR

156th TACTICAL FIGHTER GROUP
PUERTO RICO AIR NATIONAL GUARD
LUIS MUNOZ MARIN INTERNATIONAL AIRPORT
SAN JUAN, PUERTO RICO;

140th AIRCRAFT CONTROL AND WARNING SQUADRON
PUERTO RICO AIR NATIONAL GUARD
TOA BAJA, PUERTO RICO;

AND

141st AIRCRAFT CONTROL AND WARNING SQUADRON
PUERTO RICO AIR NATIONAL GUARD
AGUADILLA, PUERTO RICO

October 1988

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20310

Prepared by

Hazardous Materials Technical Center
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EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in April 1988 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 156th Tactical Fighter Group (TFG) at Muniz Air National Guard Base, Luis Munoz Marin International Airport, San Juan, Puerto Rico (hereinafter referred to as the Base), under Contract No. DLA-900-82-C-4426. Also covered by this Preliminary Assessment are the two tenant units of the 156th TFG: the 140th Aircraft Control and Warning Squadron (ACWS) at Toa Baja, Puerto Rico, and the 141st ACWS at Aguadilla, Puerto Rico. The Preliminary Assessment included:

- an onsite visit, including interviews with 27 past and present Base employees, conducted by HMTC personnel during 18 to 23 April 1988;
- the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base;
- the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies; and
- the identification of sites on the Base that are potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

B. Major Findings

Past Base operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. Base shops that use and dispose of HM/HW include Vehicle Maintenance; Aerospace Ground Equipment (AGE) Maintenance; Petroleum, Oils, and Lubricants (POL) Management; Aircraft Maintenance; Weapons Maintenance; and Corrosion Control. Waste oils, recovered fuel, spent cleaners, strippers, and solvents are generated by these activities.

Interviews with past and present Base personnel and a field survey resulted in the identification of 10 disposal and/or spill sites at the Base that are potentially contaminated with HM/HW. Three sites were also identified at the 140th ACWS. All the sites were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Methodology (HARM).

SITES AT THE 156th TFG:

Site No. 1 - JP-4 Spill Area (HAS-67)

In 1972, JP-4 was being stored in two 50,000-gallon fuel bladders where Building No. 12A is located today. On 18 November 1972, one of the bladders burst, releasing 45,000 gallons of JP-4. The fuel flowed eastward in a trench which was located along the present-day Thunderbolt Street. Some fuel also flowed south into a swampy area. No cleanup of the spill was attempted.

Site No. 2 - Aircraft Burial Area (HAS-45)

On 12 January 1981, terrorists destroyed nine aircraft at the Base. The unsalvagable remains of the planes were buried in the southeast corner of the Base. Depleted uranium ballast and heavy metals are concerns at this site.

Site No. 3 - Underground JP-5 Fuel Line Leak (HAS-58)

In 1981, an underground fuel line at the POL facility leaked approximately 2,200 gallons of JP-5 over an 8-day period. Very little fuel was recovered.

Site No. 4 - Underground Waste Oil Tank (HAS-56)

Waste oils, JP-5, and PD-680 solvent are accumulated in a 950-gallon underground tank east of Building No. 3. The tank is pumped periodically

by a contractor. The soil over the tank is bare and very stained from spillage.

Site No. 5 - Corrosion Control Hangar (HAS-61)

An oil/water separator (OWS) is connected to the sanitary sewer drains at the Corrosion Control Hangar. During heavy rains, runoff from the flightline flows into the drains and into the OWS. The contents of the OWS are then forced out through the vents and onto the soil. The soil is blackened and oily to a depth of several inches. Spilled PD-680 solvent from a large aboveground tank south of the hangar also flows onto the soil.

Site No. 6 - POL Facility Drainage (HAS-61)

All the drains within the POL Facility lead to an open OWS in the southeast corner of the POL area. Effluent from this OWS is discharged to a storm sewer line and into the mangrove swamp south of the Base. A large-diameter bypass around the OWS leads directly to the storm sewer line. An area of dead mangroves surrounds the storm sewer outfall.

Site No. 7 - Alert Hangar (HAS-56)

An unknown amount of waste solvents and thinners has been dumped on the ground and into a drain next to the Alert Hangar. The soil at this site is very stained and surrounding vegetation is stressed.

Site No. 8 - Motor Pool (HAS-56)

Behind Building No. 14, new lube oil drums are stored on racks on a concrete pad. The concrete is stained from spillage and soil next to the pad is stained and oily. A container of floor cleaner (dilute hydrochloric acid) has overturned and deteriorated the concrete.

Site No. 9 - Trim Pad (HAS-56)

During each defueling operation, 10 to 20 gallons of JP-5 are drained from the A-7D wing tanks. The JP-5 is then dumped on the grass around the Trim Pad. As this operation occurs two or three times per month, between 3,120 and 9,360 gallons of JP-5 may have been released in this area over the 12 years the Base has had the A-7D aircraft. In the past, waste oils, hydraulic fluid, and PD-680 solvent were also dumped in this area.

Site No. 10 - Abandoned Underground Storage Tank (HAS-43)

An abandoned 1,000-gallon underground storage tank is located west of the Main Hangar. The tank, which originally held diesel fuel, may not have been emptied before abandonment.

SITES AT THE 140th ACWS:

Site No. 1 - Waste Oil Pit (HAS-43)

Until 1985, a concrete-lined pit held waste oils, rainwater, and possibly solvents. In 1985, the pit was filled with sand. Any remaining oils or solvents in the pit may leach into the ground with infiltrating rainfall.

Site No. 2 - PCB Transformer Oil Dump (HAS-51)

PCB transformer oil was dumped near the steps of the Radome Tower Building and also near the concrete on the south side of the tower. The tower was built in 1964. The 5 gallons of oil within the transformer was changed once every 5 years since 1964, for a total of 20 to 25 gallons of PCB transformer oil released at this site. Vegetation is stressed at this site.

Site No. 3 - Abandoned Underground Storage Tanks (HAS-43)

Two abandoned underground storage tanks, each with a capacity of 1,500 gallons, remain at the 140th ACWS near Building No. 4. One tank originally held diesel fuel and the other held gasoline.

C. Conclusions

Information obtained through interviews with past and present Base personnel resulted in the identification of 10 areas on the Base and three areas at the 140th ACWS that are potentially contaminated with HM/HW. At each of the identified sites, the potential exists for contamination of soils, surface water, or groundwater and subsequent contaminant migration. Each of these sites was therefore assigned a HAS according to HARM. No potentially contaminated sites were identified at the 141st ACWS.

D. Recommendations

Further IRP investigation is recommended for each of the 13 identified sites.

I. INTRODUCTION

A. Background

The 156th Tactical Fighter Group (TFG) is located at the Muniz Air National Guard Base at the Luis Munoz Marin International Airport, San Juan, Puerto Rico (hereinafter referred to as the Base). The Base was established at the San Juan airport in 1956. The 140th Aircraft Control and Warning Squadron (ACWS) was established at Toa Baja, Puerto Rico, in 1954 and at Aguadilla, Puerto Rico, in 1964. The detachment of the 140th ACWS at Aguadilla became an independent squadron, the 141st ACWS, in 1985. Past operations at the Base and its tenant units involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP). The IRP consists of the following:

- o Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- o Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study.
- o Research, Development and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- o Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

B. Purpose

The purpose of this Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base, reviewed existing environmental information, analyzed Base records concerning the use and generation of hazardous material/hazardous waste (HM/HW), and conducted inter-

views with past and present Base personnel familiar with past hazardous materials management activities. A physical inspection was made of the various facilities and of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base, with special emphasis on the history of the shop operations and their past HM/HW management procedures; local geologic, hydrologic, and meteorologic conditions that may affect migration of contaminants; local land use and public utilities that could affect the potential for exposure to contaminants; and the ecologic settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to operations at the Base and its tenant units and includes:

- An onsite visit;
- The acquisition of pertinent information and records on hazardous materials use, hazardous wastes generation, and disposal practices at the Base;
- The acquisition of available geologic, hydrologic, meteorologic, land use, critical habitat, and utility data from various Federal, State, and local agencies;
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions.

The onsite visit and interviews with past and present Base personnel were conducted during the period 18 to 23 April 1988. The Preliminary Assessment was conducted by Ms. Janet Emry, Hydrogeologist/Task Manager; Mr. Raymond Clark, Jr., P.E./Department Manager; Mr. Mark Pape, Civil Engineer; and Ms. Natasha Brock, Environmental Scientist. Other HMTC personnel who assisted with the Preliminary Assessment include Mr. Mark Johnson, P.G./Program Manager (Appendix A). Personnel from the Air National Guard Support Center who assisted in the Preliminary Assessment include Lt. Col. Michael Washeleski

(Project Officer), and SMS James Craig (Alternate Project Officer). The Point of Contact (POC) at the Base is Maj. Edwin Figueroa, Base Civil Engineer (156th CES/DE).

D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent site-specific information and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the installation that may use hazardous materials or generate hazardous wastes. Next, an evaluation of both past and present HM/HW handling procedures is made to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews also define the areas on the Base where any HM/HW, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or otherwise released into the environment.

Historic records contained in the Base files are collected and reviewed to supplement the information obtained from interviews. Using this information, a list of HM/HW spill/disposal sites on the Base is identified for further evaluation. A general survey tour of the identified sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geologic, hydrologic, meteorologic, land use, and environmental data for the area of study is also obtained from the POC, and from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal and/or spills may

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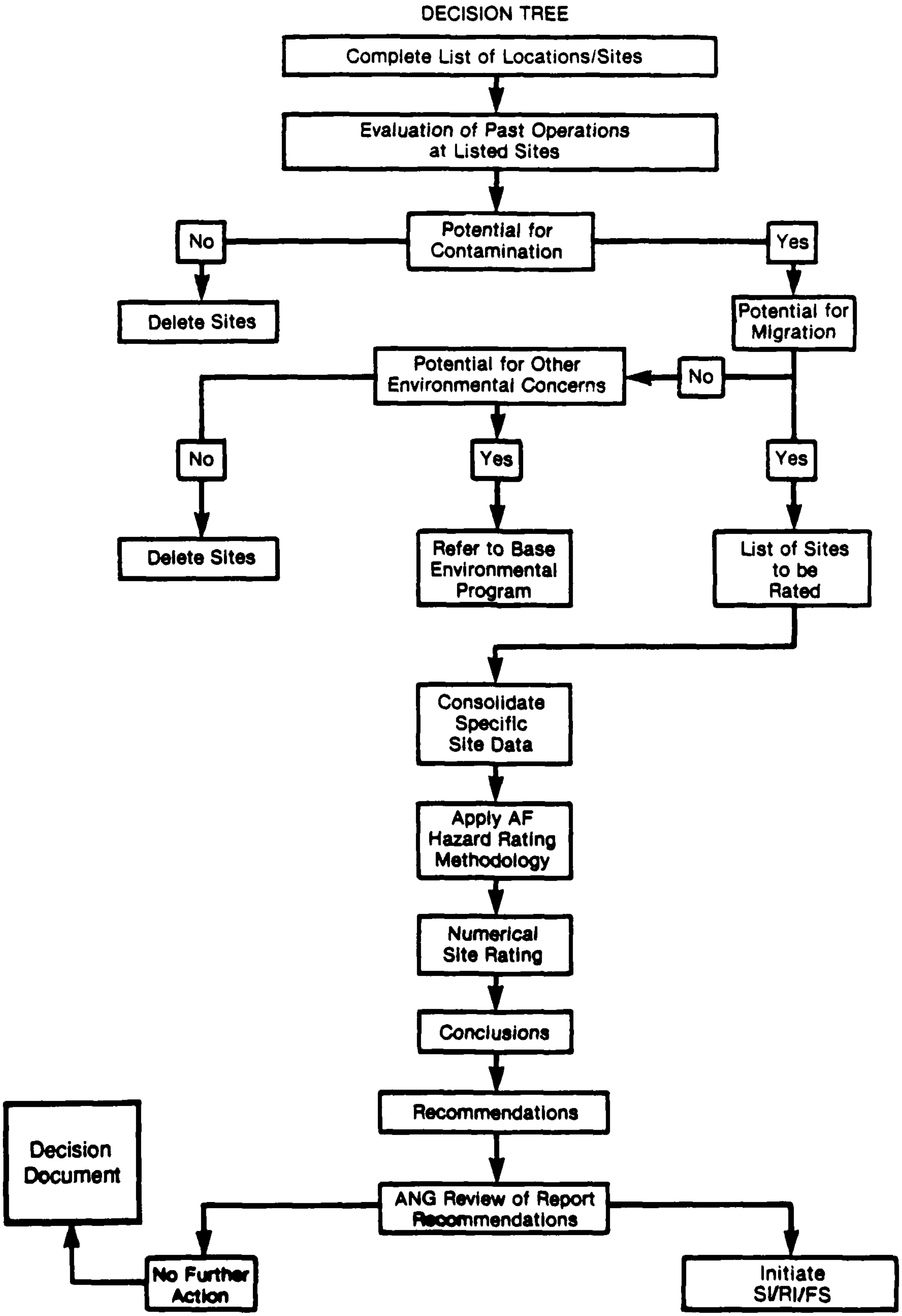
INSTALLATION
RESTORATION PROGRAM

Figure 1.

Preliminary Assessment Methodology Flow Chart.



have occurred. Where sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather may indicate a lack of data. The HAS is computed from the data included in the Factor Rating Criteria (Appendix D).

II. INSTALLATION DESCRIPTION

A. Location

The 156th TFG of the Puerto Rico Air National Guard is located at the Muniz Air National Guard Base, at the Luis Munoz Marin International Airport, San Juan, Puerto Rico. The Base presently leases approximately 44 acres between the northeast-southwest runway and the east-west runway from the Puerto Rico Ports Authority. An additional 42 acres east of the Base will be leased in the future. A drainage canal is located between the Base and the northeast-southwest runway. Figure 2a shows the location and boundaries of the Base property covered by this Preliminary Assessment.

The 140th ACWS is located at Punta Salinas in Toa Baja, Puerto Rico. The installation consists of Punta Salinas, a point of land jutting into the Atlantic Ocean, and a small island to the east. A causeway connects the point and the island. The location and boundaries of this property are shown in Figure 2b.

The 141st ACWS is located at Punta Borinquen Field (formerly Ramey Air Force Base) near Aguadilla, Puerto Rico. The location and boundaries of this property are shown in Figure 2c.

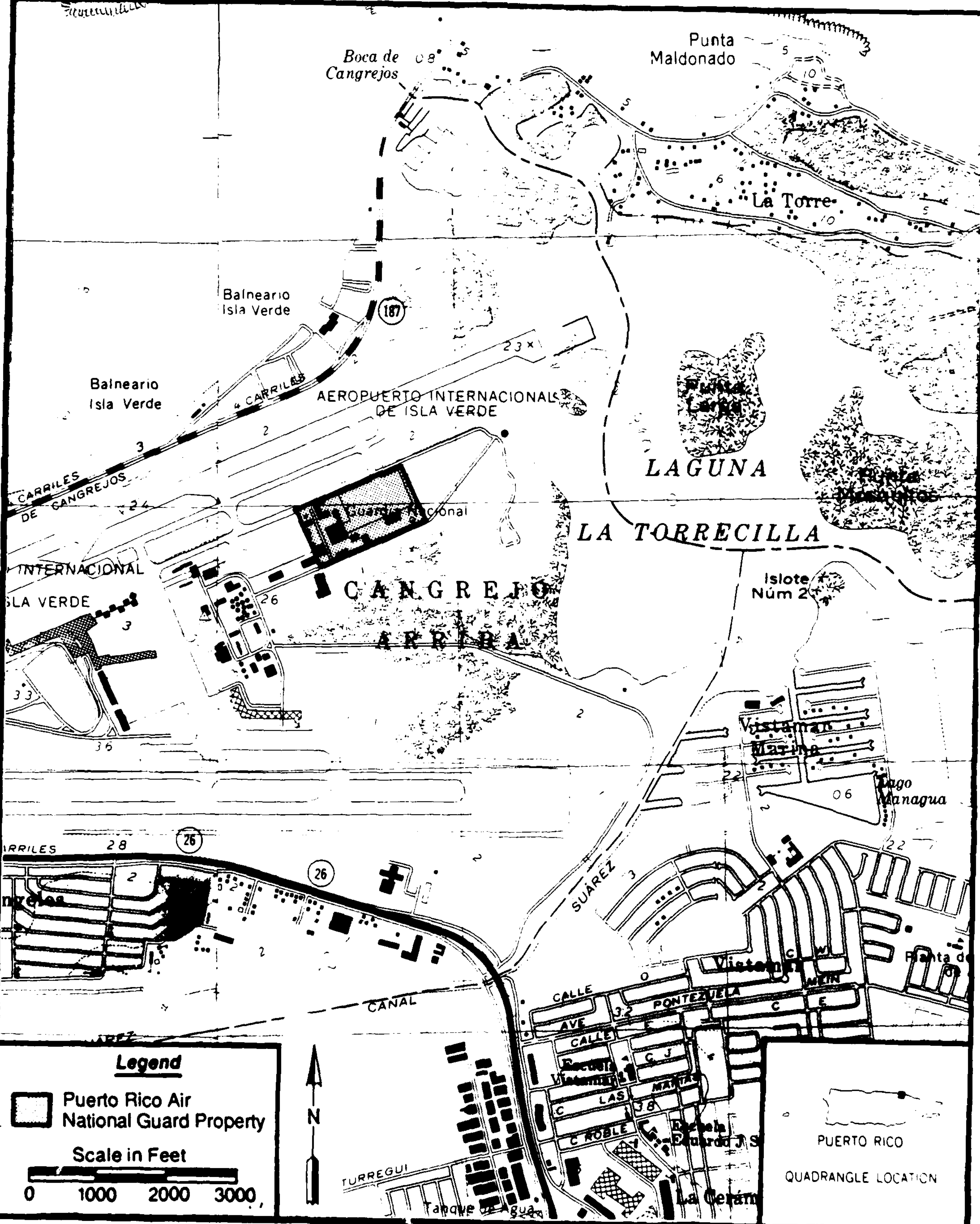
B. Organization and History of the 156th TFG

The Puerto Rico Air National Guard was first organized and federally recognized on 23 November 1947 with a total strength of 13 officers and 32 airmen. The organization was composed of several units: the 198th Fighter Squadron, the 198th Air Service Group, and the 198th Weather Station. The units were located at the Isla Grande Airport and were equipped with P-47, T-6, and C-47 aircraft. During November 1950, the 198th Tactical Fighter Squadron was mobilized for a total of 11 days as a result of the Nationalist Revolt which occurred in Puerto Rico. During this period, pilots flew air reconnaisance missions and mercy missions to transport blood and essential

HMTC

Source: USGS 7.5 minute topographic quadrangles, San Juan and Carolina, Puerto Rico.

Figure 2a.
Location Map of the 156th TFG, Puerto Rico Air National Guard, San Juan, Puerto Rico.



Source: USGS 7.5 minute topographic quadrangle, Bayamon, Puerto Rico.

Figure 2b.

Location Map of the 140th ACWS, Puerto Rico Air National Guard, Toa Baja, Puerto Rico.

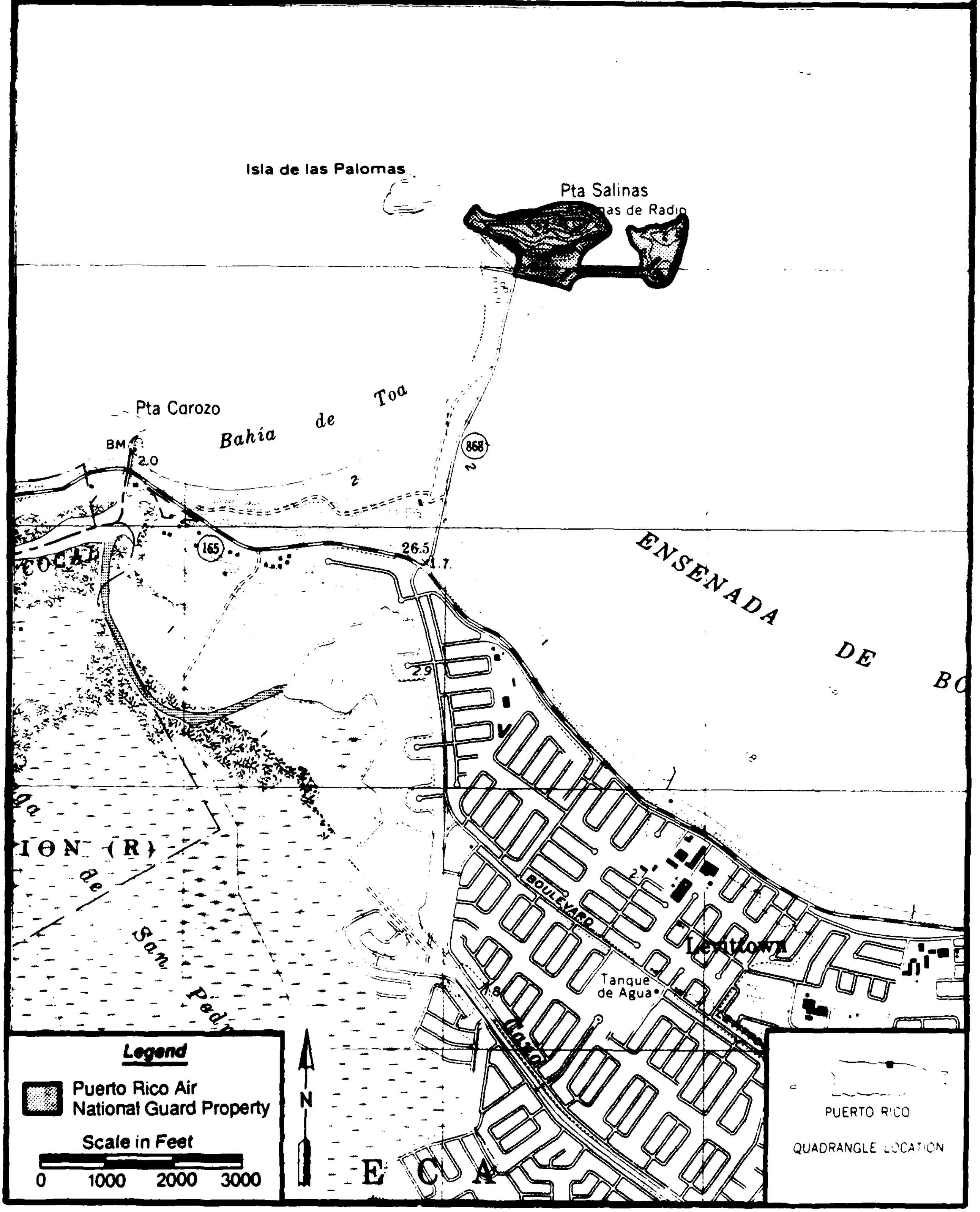
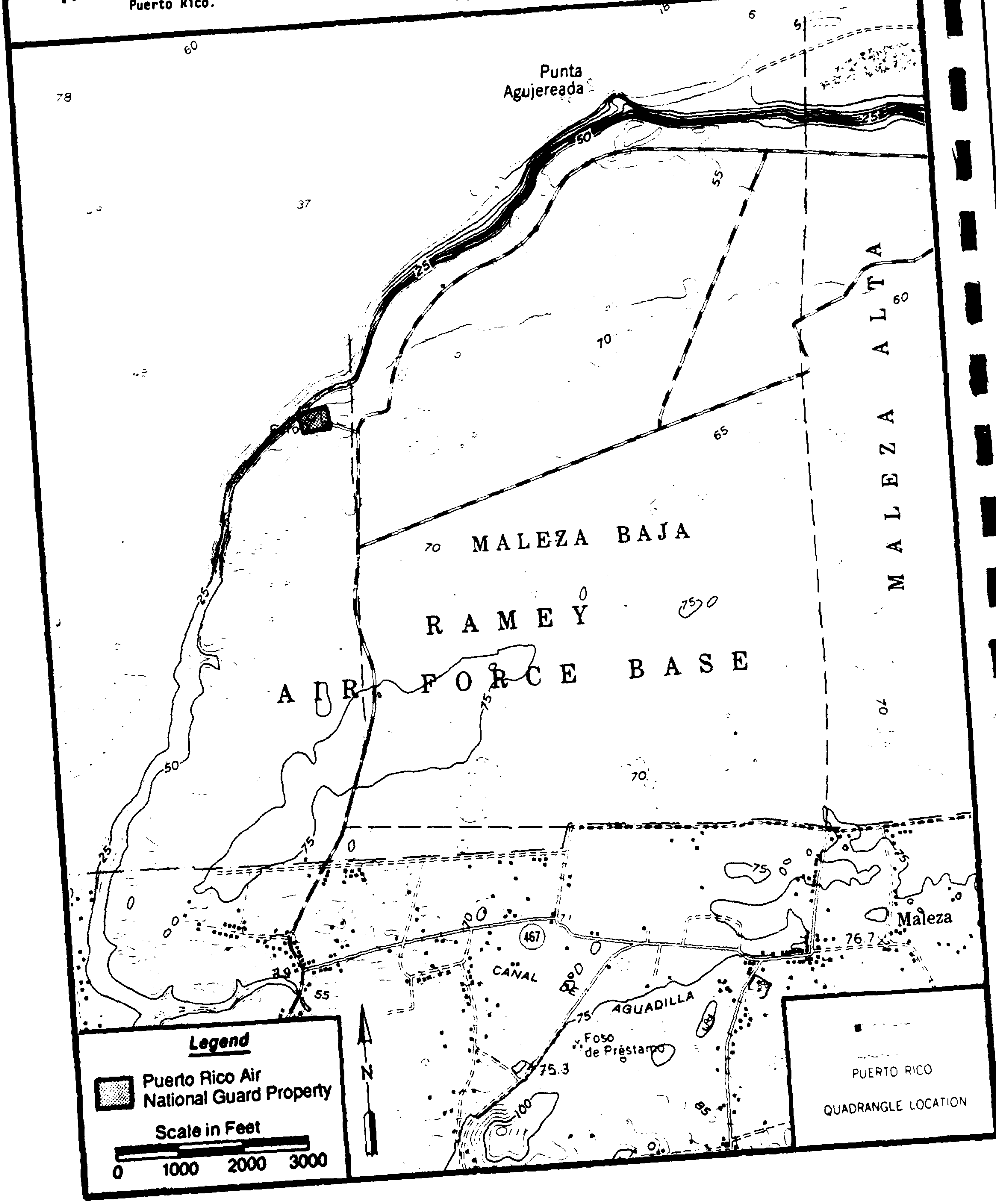


Figure 2c.

HMTC

Source: USGS 7.5 minute topographic quadrangle, Aguadilla, Puerto Rico.

Location Map of the 141st ACWS, Puerto Rico Air National Guard, Aguadilla, Puerto Rico.



medical supplies to various towns in the interior of the island. On 1 December 1950, the various units were combined to form the 198th Fighter Squadron. In 1952, the unit was redesignated twice, first as a Fighter/Bomber unit and then as a Fighter Interceptor unit.

In 1954, the Puerto Rico Air National Guard received its first jet aircraft, two T-33s. These aircraft were based at the new San Juan International Airport, then under construction. By June 1955, the unit was assigned four F-86Es, seven T-33s, one C-47, two T-6s, and two L-16s. The unit moved into its new facilities at the San Juan airport in May 1956.

The unit was reorganized and activated as the 156th Tactical Fighter Group on 10 April 1958, flying the F-86D. In 1960, the group converted to the F-86H aircraft, and in 1967 to the F-104C "Starfighter." During the fall of 1963, the group was partially mobilized as a result of the Cuban Crisis and pilots and aircraft were maintained in alert status. From 1964 to 1976, the group maintained a unique dual mission for both the Tactical Air Command and the Air Defense Command. This mission included training and management as well as providing air defense to the Puerto Rico Defense sector.

Since January 1976, the 156th TFG has flown the A-7D "Corsair" aircraft. The mission of the 156th TFG was to employ conventional munitions against surface targets in the Interdiction, Offensive Counterair, and Close Air Support Missions during day and low threat night conditions.

In the early morning hours of 12 January 1981, members of the terrorist group known as "Los Macheteros" infiltrated the Base and planted time bombs in equipment. This attack resulted in the total destruction of eight A-7D aircraft and one F-104 on static display, and severe damage to two A-7Ds and two vehicles. In 1985, the 156th TFG's mission was expanded to include maritime training. The group presently has an inventory of 20 A-7Ds.

C. Organization and History of the 140th ACWS and 141st ACWS

Authorization from the National Guard Bureau to organize and activate the 140th Aircraft Control and Warning Flight at Toa Baja, Puerto Rico, was

received on 19 April 1954. Federal recognition for the organization came on 29 August 1954. On 1 October 1960, the 140th was reorganized into a full squadron. In 1964, Detachment #1 of the 140th ACWS was established at Aguadilla, Puerto Rico. The National Guard Bureau converted Detachment #1 into an individual squadron, the 141st ACWS, in September 1985.

III. ENVIRONMENTAL SETTING

A. Meteorology

The climate of Puerto Rico is tropical maritime, characterized by mild temperatures, plenty of sunshine, and adequate rainfall. The climate is predominantly controlled by the tradewinds, which blow constantly at a speed of 5 to 15 miles per hour. During the day, the wind is usually from the east; during the night, the wind shifts to the south or southeast. Rainfall varies widely over the island because of differences in topography.

The San Juan area receives nearly 60 inches of rainfall annually. Rainfall averages 6 to 7 inches per month from May to November, decreasing to an average of 2 inches in March (Base Master Plan, 1986). By calculating the net precipitation according to the method outlined in the Federal Register (47 FR 31224), a net precipitation value of negative 22.6 inches per year is obtained. Maximum rainfall intensity, based on a 1-year, 24-hour rainfall, is 10.55 inches (47 FR 31235). Average temperature in San Juan ranges from 74°F in winter to 80°F in summer (Base Master Plan, 1986).

The Toa Baja area receives approximately 65 inches of rainfall annually. In Aguadilla, the annual rainfall is approximately 51 inches. Net precipitation in this area is negative 27.8 inches per year and maximum rainfall intensity is approximately 9 inches.

B. Geology

Puerto Rico is the easternmost and smallest of the four islands - Cuba, Jamaica, Hispaniola, and Puerto Rico - known as the Greater Antilles. The islands of the Greater Antilles represent remnants of a large landmass that formerly existed from Cuba to the Virgin Islands and has been broken up by faulting. The downfaulted blocks form some of the greatest deeps of the Atlantic Ocean and Caribbean Sea (Roberts, 1942; McGuinness, 1947).

Puerto Rico, together with the other major islands of the Greater Antilles, is built largely of volcanic and intrusive rocks of late Cretaceous Age. The volcanic rocks consist largely of andesite, agglomerate, tuff, and ashy shale. Interbedded with the ashy shale are a number of limestone units. Following their deposition, the volcanic rocks and limestones were folded by strong pressures from the south and southwest and were intruded by dioritic rocks. The dioritic rocks appear to underlie the entire island (McGuinness, 1947).

The Cretaceous rocks are flanked on the north and south by clastic sediments and limestones whose deposition began in middle Oligocene time and extended through lower Miocene time. During the Pleistocene, the Antillean landmass was broken up by faulting, and the block comprising Puerto Rico and the northern Virgin Islands was arched and tilted to the northeast. This resulted in uplift of the western part of the island and in drowning of the valleys in the east. Extensive deposits of gravel, sand, and clay were laid down in the valleys and around the edges of the island (McGuinness, 1947).

The island of Puerto Rico is nearly rectangular, with a length of 113 miles, an average width of 41 miles, and an area of about 3,435 square miles. The island is bounded on the north and east by the Atlantic Ocean, on the south by the Caribbean Sea, and on the west by Mona Passage. Puerto Rico may be divided into three physiographic provinces: the complex mountain ranges, the coastal plains, and the playa plains (Roberts, 1942). The Base and its tenant units, the 140th and 141st ACWS, are located within the coastal plain province, which parallels nearly the entire coastline. In the San Juan area, the coastal plain has been built up by the accumulation of alluvial and colluvial sediments derived from the uplands to the south (Kaye, 1959).

The topography of the Base is predominantly level, with elevations ranging from 3 to 9 feet above mean sea level. The Base is underlain by approximately 7 feet of artificial fill, material from various sources which was brought in and dumped in the low swamp to provide building foundations. Underlying the artificial fill are Quaternary swamp deposits consisting of 40 to 50 feet of sandy muck, clayey sand, and peat. Beneath these surficial deposits is a highly weathered alluvium of early Pleistocene or late Pliocene Age. This unit

may also include some residual soil, colluvium, and estuarine sediments. The alluvium consists mostly of red silty clays with variable amounts of quartz sand. This unit is very variable in thickness and may exceed 100 feet in some localities (Kaye, 1959).

Underlying the alluvium is the early Miocene Aymamon Limestone. This formation consists of medium- to thick-bedded, dense, white to pink limestone with minor amounts of marl, sand, and clay. The unit varies in thickness from 950 to 2,000 feet. Beneath the Aymamon Limestone is approximately 350 feet of early Miocene friable sandstone, clay, and concretionary limestone called the Aguada Formation. The rest of the stratigraphic sequence beneath the Aguada Formation is of late Cretaceous and early Tertiary Age and consists of highly deformed and faulted volcanic flows, pyroclastics, sedimentary rocks, and intrusives (Kaye, 1959).

Near Toa Baja, the coast is a low-lying alluvial plain broken by several large swamps, lagoons, and large lunate embayments. Offshore islets and rocks, such as Punta Salinas where the 140th ACWS is located, are the tops of submerged, cemented dunes. These dunes are Pleistocene eolianite deposits, wind-deposited sand cemented with calcium carbonate (lime) (Kaye, 1959).

The 141st ACWS at Aguadilla is underlain by the early Miocene Aymamon and Aguada Formations and the late Cretaceous and early Tertiary volcanics and related rocks (Roberts, 1942; Kaye, 1959).

C. Soils

According to the U.S. Soil Conservation Service, the Base is built on Made Land, areas where the soil profile has been covered or destroyed by earthmoving operations, generally for engineering purposes. The permeability of the soils at the Base ranges from slow to moderate (from 4.21×10^{-5} cm/sec to 1.41×10^{-3} cm/sec).

The soils at the 140th ACWS consist primarily of the Tanama-Rock outcrop complex. This complex consists of shallow, well drained soils that formed on limestone slopes of 20 to 60 percent. The surface layer of this soil is a dark

reddish-brown clay containing limestone fragments. The subsoil is reddish-brown clay about 10 inches thick. Below the soil is semiconsolidated limestone bedrock. Permeability of the soils at the 140th ACWS is moderate (4.45×10^{-4} cm/sec to 1.41×10^{-3} cm/sec). Runoff is rapid and erosion is a hazard.

The soils at the 141st ACWS consist of the Bejucos-Jobos association. This association consists of soils formed on the nearly level to rolling terrain of the coastal plain adjacent to the Atlantic Ocean. The soils within this association are strongly leached, well drained, and strongly acid. The surface 'er is sandy and the subsoil is mottled, compact, and composed predominantly of clay. Permeability of the soils at the 141st ACWS is moderately rapid (1.41×10^{-3} cm/sec to 4.24×10^{-3} cm/sec).

D. Hydrology

Surface Water

Water is supplied to the Base by the Puerto Rico Water and Sewer Authority from the water treatment plant located in Trujillo Alto, about 6 miles south of the Base. The water is obtained from the Rio Grande de Loiza.

Surface runoff drains off the Base via the storm drainage system. Runoff on the northern portion of the Base, including the aircraft parking apron, discharges to the drainage canal north of the Base. In the southern portion of the Base, storm drainage discharges to the mangrove swamp south of the Base. Storm drainage in the eastern portion of the Base discharges into the low-lying swampy area east of the Base. These drainages then empty into the Torrecilla Lagoon.

At the 140th ACWS at Punta Salinas and the 141st ACWS at Aguadilla, storm runoff discharges to the Atlantic Ocean.

Groundwater

The rocks of Puerto Rico include three classes of aquifers: the late Cretaceous volcanic and intrusive rocks, the Tertiary limestones, and the Quaternary alluvium and littoral deposits.

The Cretaceous rocks yield water only from fractures and weathered zones; some interbedded crystalline limestones yield water from solution channels. Yield from the igneous rocks is usually small, averaging 10 to 15 gallons per minute.

The Tertiary rocks range from poor to excellent as aquifers. The poorest are the clays, shales, and argillaceous limestones laid down during the early stages of deposition. The most productive are the pure reef complex limestones of the north and south coasts. Wells within these limestones can yield as much as 10,000 to 20,000 gallons per minute.

The most important aquifers on the island, however, are the surficial Quaternary sand and gravel alluvial deposits. Wells within these deposits commonly yield several thousand gallons per minute. Irrigation is an important source of recharge to this aquifer.

In the vicinity of the Base, the groundwater is not used as a source of potable water. Groundwater within the unconfined surficial aquifer, however, discharges to local waterways and, if contaminated, may degrade surface water quality. The water table occurs at depths ranging from 5 to 8 feet.

E. Critical Habitats/Endangered or Threatened Species

According to the U.S. Fish and Wildlife Service, the brown pelican (*Pelecanus occidentalis*) is the only endangered or threatened species within a 1-mile radius of the Base. Immediately south of the Base is a protected mangrove swamp.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. A total of 27 past and present Base personnel with an average of 22 years experience at the Base were interviewed. These personnel were representative of the following Base shops: Aircraft Maintenance; Facilities Maintenance; Vehicle Maintenance; Corrosion Control; Aerospace Ground Equipment (AGE) Maintenance; Petroleum, Oils, and Lubricants (POL) Management; Photography Lab; Nondestructive Inspection (NDI); and Flightline. Table 1 provides estimates of the quantities of waste currently being generated by these shops and describes the past and present disposal practices for the wastes. Based on information gathered, any shop that is not listed in Table 1 has been determined to produce negligible quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Base personnel and subsequent site inspections resulted in the identification of 10 sites at the Base and three sites at the 140th ACWS potentially contaminated with HM/HW. No potentially contaminated sites were identified at the 141st ACWS. Figure 3a illustrates the locations of the identified sites at the Base and Figure 3b illustrates the locations of the identified sites at the 140th ACWS. Figure 3c shows the facilities at the 141st ACWS.

Each of the 13 identified sites was assigned a HAS according to HARM (Appendix C). A summary of the HAS for each scored site is listed in Tables 2a and 2b. Copies of the completed Hazardous Assessment Rating Forms are found in Appendix D. The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances.

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Puerto Rico Air National Guard, Luis Munoz Marin International Airport, San Juan, Puerto Rico

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal (1950–1990)
Aircraft Maintenance (Building No. 1)	PD-680 Solvent (Type II)	200	GRND; OWS SAN
	Synthetic Turbine Engine Oil	120	FTA; SPLY
	JP-4 Jet Fuel	600	FTA
	JP-5 Jet Fuel	600	FTA
	7808 Oil	80	FTA
	Hydraulic Oil	100	GRND; FTA
	Engine Oil	500	GRND; FTA
	Cleaning Compound	100	GRND; OWS SAN
Aerospace Ground Equipment (AGE) Maintenance (Building No. 8)	Engine Oil	220	GRND; DRMO
	Hydraulic Oil	216	GRND; DRMO
	PD-680 Solvent (Type II)	60	STORM
	Turbine Oil	24	GRND; DRMO
	Battery Acid	80	NEUTR SAN
	Used Batteries	25 each	SPLY

KEY:

CONTR - Disposed of through a contractor
DRMO - Disposed of through the local Defense Reutilization and Marketing Office
FTA - Burned at offbase fire training area
GRND - Disposed of on ground
NEUTR - Neutralized (acids)
OWS - Disposed of in drains leading to oil/water separator
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Collected for silver recovery
SPLY - Turned in to base supply for recovery
STORM - Disposed of in drains leading to storm sewer
TRASH - Disposed with municipal trash pick-up

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Puerto Rico Air National Guard, Luis Munoz Marin International Airport, San Juan, Puerto Rico (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal (1950–1990)
Nondestructive Inspection (NDI) (Building No. 1)	Developer	10	SAN (1970–1990)
	Fixer	10	SIL REC (1970–1990)
Weapons Maintenance (Building No. 19)	Rifle Bore Cleaner	60	GRND (1955–1980); DRMO (1980–1990)
	Dry Cleaning Solvent	80	GRND (1955–1980); DRMO (1980–1990)
	Waste Paint	10	GRND (1955–1980); DRMO (1980–1990)
	Thinners/Lacquers	20	GRND (1955–1980); DRMO (1980–1990)
	PD-680 Solvent (Type II)	60	GRND (1955–1980); DRMO (1980–1990)
Corrosion Control (Building No. 3)	PD-680 Solvent (Type II)	500	STORM (1955–1980); OWS SAN (1980–1990)
Paint Shop (Building No. 3)	Solvents	400	STORM (1955–1980); OWS SAN (1980–1990)
	Paint Containers	24	TRASH (1955–1990)

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GRND - Disposed of on ground
NEUTR - Neutralized (acids)
OWS - Disposed of in drains leading to oil/water separator
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Collected for silver recovery
SPLY - Turned in to base supply for recovery
STORM - Disposed of in drains leading to storm sewer
TRASH - Disposed with municipal trash pick-up

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Puerto Rico Air National Guard, Luis Munoz Marin International Airport, San Juan, Puerto Rico (Concluded)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal (1950–1990)
Electric Shop (Building No. 1)	Potassium Hydroxide Cells	50 each	1970–1988: SPLY
Battery Shop (Building No. 1)	Used Batteries	25 each	1970–1988: SPLY
Propulsion Shop (Building No. 1)	PD-680 Solvent (Type II)	55	1970–1980: GRND; 1980–1988: OWS SAN
	7808 Oil	110	1970–1988: OWS SAN
Vehicle Maintenance (Building Nos. 6 and 14)	Engine Oil	330	1955–1988: SPLY
	Lubricating Oil	900	1955–1988: SPLY
	Hydraulic Oil	25	1955–1988: SPLY
	Gasoline	—	1955–1988: CONTR
	Diesel Fuel	—	1955–1988: CONTR

KEY:

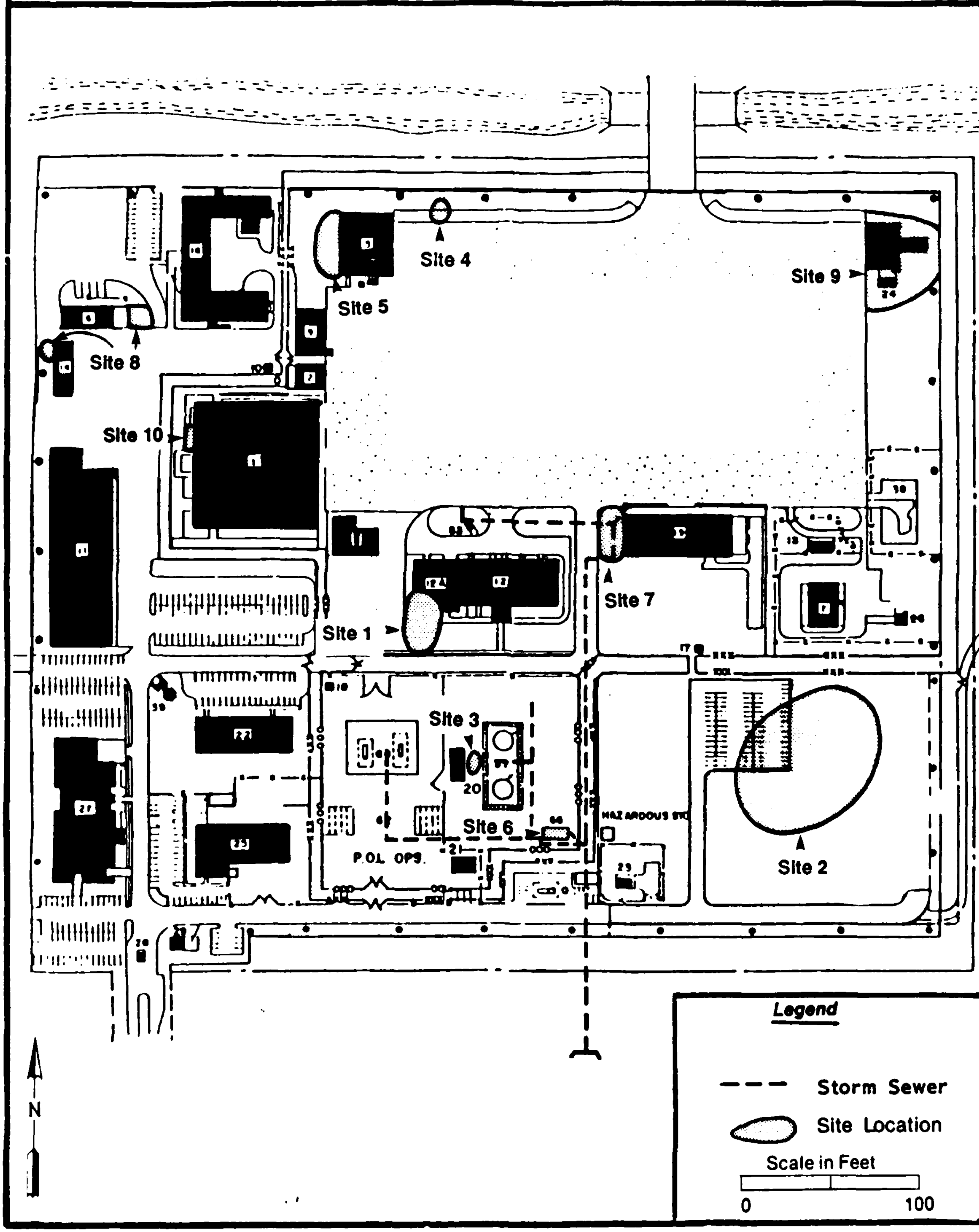
CONTR - Disposed of through a contractor
DRMO - Disposed of through the local Defense Reutilization and Marketing Office
FTA - Burned at offbase fire training area
GRND - Disposed of on ground
NEUTR - Neutralized (acids)
OWS - Disposed of in drains leading to oil/water separator
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Collected for silver recovery
SPLY - Turned in to base supply for recovery
STORM - Disposed of in drains leading to storm sewer
TRASH - Disposed with municipal trash pick-up

HMTC

Source: Puerto Rico Air National Guard, Base Map.

Figure 3a.

Location of Sites at the 156th TFG, Puerto Rico Air National Guard, San Juan, Puerto Rico.

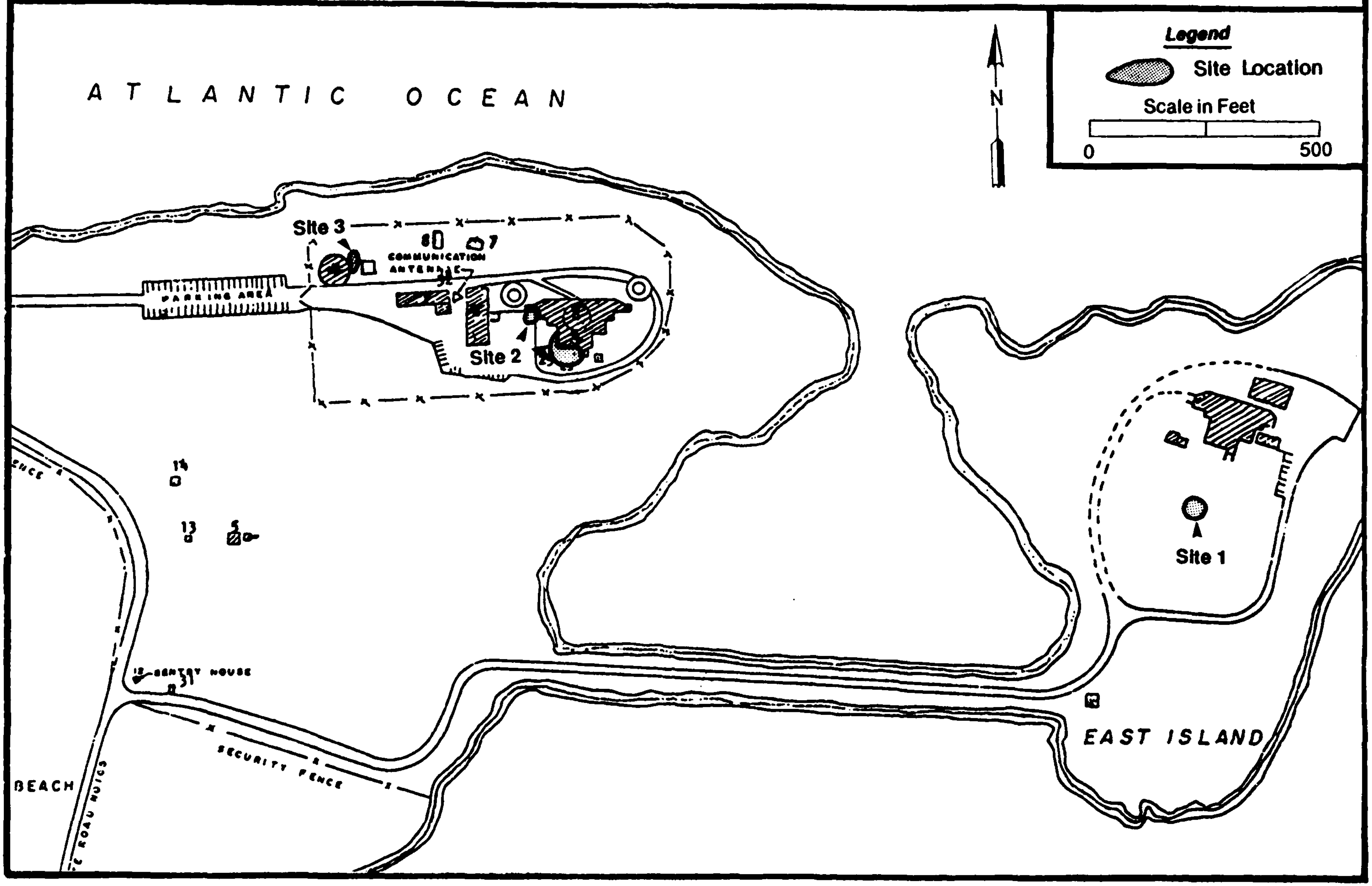


HMTC

Source: Puerto Rico Air National Guard, Base Map.

Figure 3b.

Location of Sites at the 140th ACWS, Puerto Rico Air National Guard, Toa Baja, Puerto Rico.



HMTC

Source: Puerto Rico Air National Guard, Base Map.

Figure 3c.

Base Map of the 141st, Puerto Rico Air National Guard, Aguadilla, Puerto Rico.

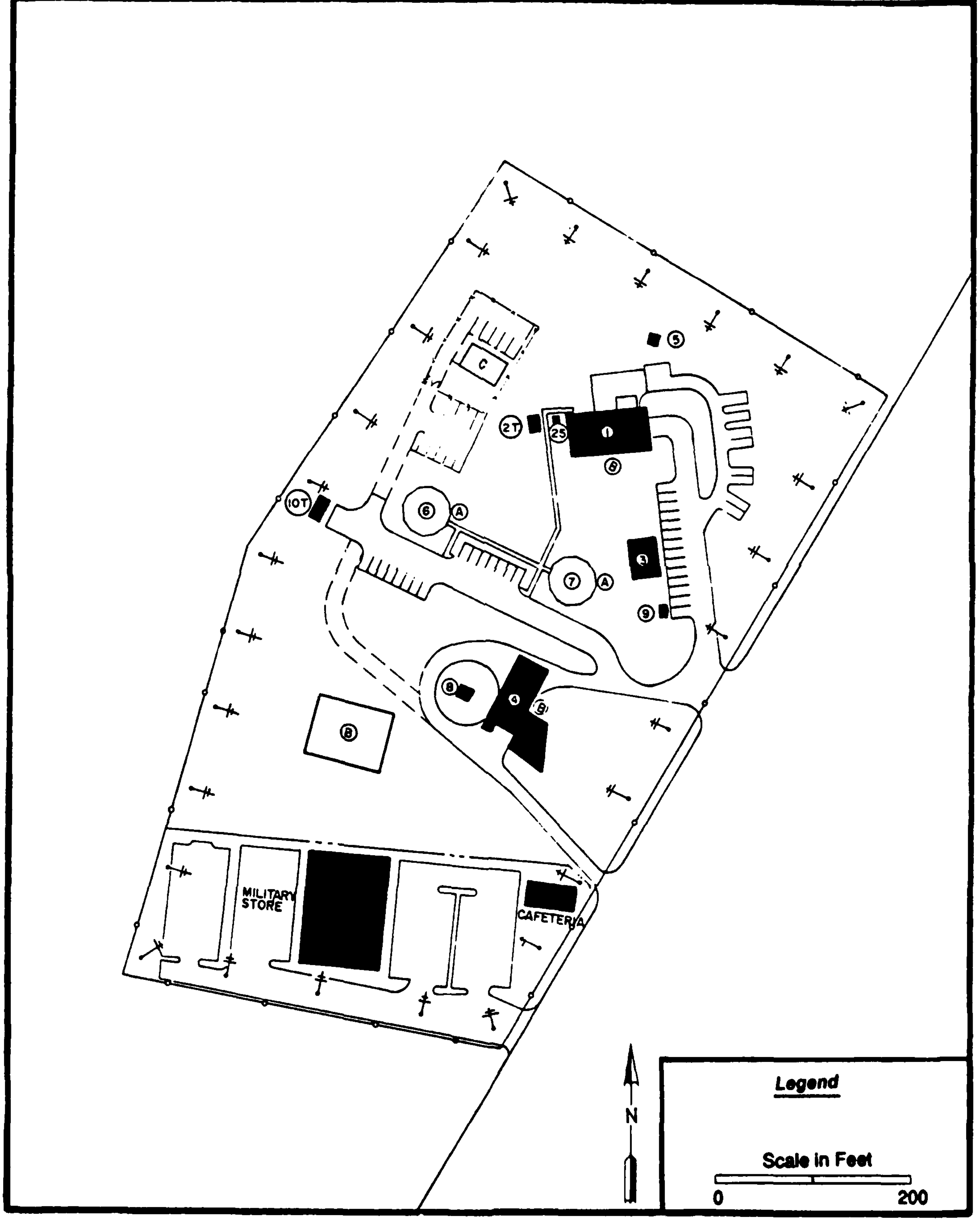


Table 2a. Site Hazard Assessment Scores (as derived from HARM): 156th TFG, Puerto Rico Air National Guard, Luis Munoz Marin International Airport, San Juan, Puerto Rico.

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	1	JP-4 Spill Area	40	80	80	1.0	67
2	6	POL Facility Drainage	40	64	80	1.0	61
3	5	Corrosion Control Hangar	40	64	80	1.0	61
4	3	Underground JP-5 Fuel Line Leak	40	64	80	0.95	58
5	4	Underground Waste Oil Tank	40	48	56	1.0	56
6	8	Motor Pool	40	48	80	1.0	56
7	7	Alert Hangar	40	48	80	1.0	56
8	9	Trim Pad	40	48	80	1.0	56
9	2	Aircraft Burial Area	40	15	80	1.0	45
10	10	Abandoned Underground Storage Tank	40	32	57	1.0	43

Table 2b. Site Hazard Assessment Scores (as derived from HARM): 140th ACWS, Puerto Rico Air National Guard, Toa Baja Puerto Rico.

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	2	PCB Transformer Oil Dump	26	48	80	1.0	51
2	3	Abandoned Underground Storage Tanks	26	32	72	1.0	43
3	1	Waste Oil Pit	26	24	80	1.0	43

The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). Descriptions of all the sites follow.

SITES AT THE 156th TFG:

Site No. 1 - JP-4 Spill Area (HAS-67)

In 1972, JP-4 was stored in two 50,000-gallon fuel bladders while work was done on the POL facility. The bladders, which were located where the Engine Shop (Building No. 12A) is today, were surrounded by a sand berm several feet high. On 18 November 1972, one of the bladders burst, releasing 45,000 gallons of JP-4. Most of the fuel flowed out of the bermed area and eastward in a trench which was located along the present-day Thunderbolt Street. Some fuel flowed south into a swampy area. No cleanup of the spill was attempted.

Site No. 2 - Aircraft Burial Area (HAS-45)

On 12 January 1981, terrorists infiltrated the Base and destroyed eight A-7D aircraft and one F-104 aircraft. The unsalvagable remains of these planes were buried in the southeast corner of the Base. Depleted uranium (which is used as ballast on the A-7D) and heavy metals are concerns at this site. This site was scored on the basis of a "small" quantity (less than 5 tons) of HM/HW.

Site No. 3 - Underground JP-5 Fuel Line Leak (HAS-58)

A release occurred at the POL facility on 27 November to 4 December 1981 when an underground fuel line leaked approximately 2,200 gallons of JP-5. A POL sheen was noted by Base personnel on stagnant storm water runoff south of the Base. A contractor was called to clean up the JP-5, but very little fuel was recovered.

Site No. 4 - Underground Waste Oil Tank (HAS-56)

Waste PD-680 solvent, hydraulic oil, JP-5, and synthetic engine oil are collected in an underground tank east of Building No. 3. The tank is believed to be an old 950-gallon boiler tank. A funnel and PVC pipe lead into the tank. The tank is pumped out periodically by a contractor. At the time of the site visit, the ground over the tank was bare and very stained and oily-looking from spillage. The area, approximately 5 feet by 3 feet in size, shows much vegetative distress around its edges. Although the amount of HM/HW released at this site could not be determined, this site was scored on the basis of a "small" quantity release (less than 1,100 gallons).

Site No. 5 - Corrosion Control Hangar (HAS-61)

Before the Corrosion Control Hangar (Building No. 3) was built in 1982, a washrack existed in the same area. Effluent from the washrack discharged directly into the drainage canal north of the Base. A catch basin or pit was used to collect waste oils. Today, if an aircraft is washed too far out of the hangar, the mixture of PD-680 solvent, water, and oil can run off into the storm sewer and into the drainage canal.

The drains at the Corrosion Control Hangar are connected to an oil/water separator (OWS) and a sanitary sewer line. During heavy rains, however, storm runoff from the flightline flows into drains and forces the contents of the OWS out through the vents and onto the soil just west of the hangar. Some of this effluent reaches a storm drain and is discharged to the canal.

A large aboveground storage tank holding PD-680 solvent is located immediately south of the hangar. Beneath the tank's tap, the asphalt is very stained and deteriorated. Spilled PD-680 apparently flows to the northwest and also onto the soil west of the building. The soil is blackened and oily-looking to a depth of 3 to 5 inches. Vegetative stress

is evident throughout the area. Although the amount of oils and PD 680 released at this site could not be determined, this site was scored on the basis of a "moderate" quantity release (between 1,100 and 4,675 gallons).

Site No. 6 - POL Facility Drainage (HAS-61)

A large, open OWS is located in the southeast corner of the POL facility. All drains within the facility, including those within the diked containment area, lead to this OWS. According to the Base Utilities Master Plan, effluent from the OWS empties into a main storm sewer line which outfalls into the mangrove swamp south of the Base. A large-diameter bypass around the OWS leads directly to the main storm sewer line. In the case of a large spill at the POL area, most of the JP-5 would bypass the OWS and go directly into the mangrove swamp. At the time of the site visit, a large area of dead mangroves surrounded the storm sewer outfall from the POL area. The discharging water was scummy and smelled heavily of petroleum. Although the amount of JP-5 released into the POL drainage system could not be determined, this site was scored on the basis of a "moderate" quantity release.

Site No. 7 - Alert Hangar (HAS-56)

Waste solvents and thinners are dumped on the ground and into a drain next to the Alert Hangar (Building No. 19). The drain leads to the same storm sewer line which collects runoff and OWS effluent from the POL area. The soil next to the hangar is very stained and oily. Much of the soil is bare; surrounding vegetation is very stressed. This site was scored on the basis of a "small" quantity release.

Site No. 8 - Motor Pool (HAS-56)

Behind Building No. 14, old batteries are stored on pallets on the ground and new lube oil drums are stored on racks on a concrete pad. The concrete beneath the new lube oil drums is stained from spillage. Soil next to the concrete (downslope) is also stained and oily-looking. Two plastic

25-gallon drums of dilute hydrochloric acid for floor cleaning are also stored at this area. At the time of the site visit, one of these drums was overturned and most of the acid had spilled across the concrete. The concrete is very stained and deteriorated in this area.

East of Building No. 6 are two fuel pumps, one for diesel fuel and one for unleaded gasoline. The diesel pump is connected to a 1,775-gallon underground storage tank (UST) and the unleaded pump is connected to a 2,000-gallon UST. Another 3,000-gallon UST contains leaded gasoline. There is obvious staining around the UST fill pipes. Standing water next to the diesel pump has an oily sheen.

Although the amount of HM/HW released at the Motor Pool could not be determined, this site was scored on the basis of a "small" quantity release.

<u>Site No. 9 - Trim Pad</u> (HAS-56)

During each aircraft defueling operation, the JP-5 drained from the A-7D wing tanks is dumped on the grass around the Trim Pad (Building No. 24). This occurs two or three times per month, with approximately 10 to 20 gallons of JP-5 each time. Over the years the Base has had the A-7D aircraft, between 3,120 and 9,360 gallons of JP-5 may have been released around the Trim Pad. In the past, waste hydraulic fluid, oils, and PD-680 solvent were also dumped onto the grass in this area. At the time of the site visit, however, no evidence of contamination was visible in this area. This site was scored on the basis of a "small" quantity release.

<u>Site No. 10 - Abandoned Underground Storage Tank</u> (HAS-43)

An abandoned 1,000-gallon UST is located west of the Main Hangar (Building No. 1). The tank originally contained diesel fuel. It is unknown if the UST was full or empty when abandoned. Because the amount of diesel fuel, if any, released from the UST could not be determined, this site was scored on the basis of a "small" quantity release.

SITES AT THE 140th ACWS:

Site No. 1 - Waste Oil Pit (HAS-43)

Until 1985, a concrete-lined pit was used to dispose of waste oils and possibly solvents. Rainwater also collected within the pit. The pit was approximately 20 feet square and 15 feet deep. In 1985, a horse fell into the pit and died a few weeks later, despite veterinary attention. The pit was then filled with sand. At the time of the site visit, no evidence could be found of the pit or of any contamination. Because of the potential for any remaining oils and solvents to leach out of the pit with infiltrating rainfall, this site was assigned a HAS. This site was scored on the basis of a "small" quantity release.

Site No. 2 - PCB Transformer Oil Dump (HAS-51)

PCB transformer oil is believed to have been dumped near the steps of the Radome Tower Building and also near the concrete on the south side of the tower. The transformer oil (5 gallons) was changed approximately once every 5 years since the tower was built in 1964. At the time of the site visit, minor vegetative stress was evident at this area. Because at least 20 to 25 gallons of PCB transformer oil were released around the tower, this site was assigned a HAS.

Site No. 3 - Abandoned Underground Storage Tanks (HAS-43)

Two abandoned underground storage tanks were discovered at the 140th ACWS. The tanks are located at Building No. 4, one of the radar towers. One tank originally contained diesel fuel; the other contained leaded gasoline. Each tank has a capacity of 1,500 gallons. Because of the possibility of leakage from the tanks, this site was scored on the basis of a "small" quantity release.

C. Other Pertinent Facts

- Twelve underground storage tanks were identified at the Base; two additional USTs were identified at the 140th ACWS. The locations and characteristics of these USTs are listed in Appendix E.

- No sanitary landfills are present on Base property.

- Sewage from the Base is received by the Puerto Rico Water and Sewer Authority system in lines which ultimately connect with the sewer main located between the Loiza Expressway and the San Juan Lagoon.

- East of the Base is a United Parcel Service (UPS) facility. Spilled oil from UPS vehicle maintenance operations has run onto Base property causing stained soil and stressed vegetation.

- Until 1978, both the storm and sanitary sewers at the 140th ACWS discharged directly into the Atlantic Ocean. The sanitary sewers are now connected to the Puerto Rico Water and Sewer Authority system.

- At the 141st ACWS, storm runoff discharges into the Atlantic Ocean. The sanitary sewer discharges into a leach field; no hazardous waste is disposed of into the sanitary sewer.

- At both the 140th ACWS and 141st ACWS, hazardous wastes are accumulated in 55-gallon drums and sent to the 156th TFG for disposal.

V. CONCLUSIONS

Information obtained through interviews with 27 past and present Base personnel, review of Base records, and field observations has resulted in the identification of 10 potentially contaminated disposal and/or spill sites on Base property. These sites are as follows:

- Site No. 1 - JP-4 Spill Area (HAS-67)
- Site No. 2 - Aircraft Burial Area (HAS-45)
- Site No. 3 - Underground JP-5 Fuel Line Leak (HAS-58)
- Site No. 4 - Underground Waste Oil Tank (HAS-56)
- Site No. 5 - Corrosion Control Hangar (HAS-61)
- Site No. 6 - POL Facility Drainage (HAS-61)
- Site No. 7 - Alert Hangar (HAS-56)
- Site No. 8 - Motor Pool (HAS-56)
- Site No. 9 - Trim Pad (HAS-56)
- Site No. 10 - Abandoned Underground Storage Tank (HAS-43)

At the 140th ACWS, the following potentially contaminated sites were identified:

- Site No. 1 - Waste Oil Pit (HAS-43)
- Site No. 2 - PCB Transformer Oil Dump (HAS-51)
- Site No. 3 - Abandoned Underground Storage Tanks (HAS-43)

Each of these sites is potentially contaminated with HM/HW and each exhibits the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned a HAS according to HARM.

No potentially contaminated sites were identified at the 141st ACWS.

VI. RECOMMENDATIONS

Further IRP investigations are recommended in accordance with applicable regulations for each of the identified sites.

GLOSSARY OF TERMS

AGGLOMERATE - Chaotic assemblage of coarse angular pyroclastic materials; volcanic breccia.

ALLUVIAL - Deposited by a stream or running water; generally unconsolidated deposits of clay, silt, sand, and gravel.

ANDESITIC - Composed of andesite, a dark-colored, fine-grained extrusive rock.

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

ARGILLACEOUS - Containing clay-size particles or clay minerals.

CLASTIC - Rock or sediment composed principally of broken fragments that are derived from pre-existing rocks or minerals and that have been transported some distance from their places of origin.

COLLUVIAL - Deposited by surface runoff, usually at the base of a slope; generally any loose, heterogeneous mass of soil material deposited at the base of a slope.

CONCRETIONARY - Characterized by concretions (hard nodules of mineral matter).

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation,

physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRETACEOUS - The final period of the Mesozoic era, thought to have covered the span of time between 135 and 65 million years ago.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this Act, on which are found those physical or biological features essential to the conservation of the species and which may require special management consideration or protection.

DIORITE - A group of igneous rocks composed of dark-colored amphibole (esp. horneblende) oligoclase, andesine, pyroxene, and small amounts of quartz; the intrusive equivalent of andesite.

DISCHARGE - The release of any waste stream or any constituent thereof to the environment.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EOLIANITE - A consolidated sedimentary rock consisting of clastic material deposited by the wind; dune sand cemented below groundwater level by calcite.

EXTRUSIVE - Igneous rock that has been erupted onto the surface of the earth, including lava flows and volcanic ash.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

INTRUSIVE - Magma emplaced into a pre-existing rock; the igneous rock mass so formed within the surrounding rock.

LIMESTONE - A sedimentary rock consisting primarily of calcium carbonate, primarily in the form of the mineral calcite.

LITTORAL - Intertidal zone, between high and low water level.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MIOCENE - An epoch of the upper Tertiary period, after the Oligocene and before the Pliocene, thought to have covered the time span between 23.7 and 5.3 million years ago.

OLIGOCENE - An epoch of the early Tertiary period, after the Eocene and before the Miocene, thought to have covered the span of time between 36.6 and 23.7 million years ago.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PLEISTOCENE - An epoch of the Quaternary period, beginning after the Pliocene epoch of the Tertiary period 2 to 3 million years ago and lasting until the start of the Recent (Holocene) epoch some 8,000 years ago.

PLIOCENE - An epoch of the Tertiary period, after the Miocene and before the Pleistocene; thought to have covered the span of time between 5 and 1.8 million years ago.

PYROCLASTIC - Clastic rock material formed by volcanic explosion or aerial expulsion from a volcanic vent.

QUATERNARY - The second period of the Cenozoic era, following the Tertiary: it began 3 to 2 million years ago and extends to the present.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (esp. by compression) of clay, silt, or mud.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	- less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	- 0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	- 0.20 to 0.63 inches per hour (1.41×10^{-4} cm/sec to 4.45×10^{-4} cm/sec)
Moderate	- 0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)
Moderately Rapid	- 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)
Rapid	- 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)
Very Rapid	- more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

TERTIARY - The first period of the Cenozoic era, thought to have covered the span of time between 65 and 3 to 2 million years ago.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

TUFF - A general term for all consolidated pyroclastic rocks.

VOLCANIC - Igneous rocks that have reached the earth's surface before solidifying; generally finely crystalline or glassy.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

BIBLIOGRAPHY

1. Boccheciamp, R.A. Soil Survey of the Humacao Area of Eastern Puerto Rico. U.S. Department of Agriculture, Soil Conservation Service, 1977.

2. Boccheciamp, R.A. Soil Survey of the San Juan Area of Puerto Rico. U.S. Department of Agriculture, Soil Conservation Service, 1978.

3. Bierbolini, R.E. Soil Survey of Mayaguez Area of Western Puerto Rico. U.S. Department of Agriculture, Soil Conservation Service, 1975.

4. Kaye, C.A. Geology of the San Juan Metropolitan Area, Puerto Rico. U.S. Geological Survey, Professional Paper 317-A, 1959.

5. Kaye, C.A. Shoreline Features and Quaternary Shoreline Changes, Puerto Rico. U.S. Geological Survey, Professional Paper 317-B, 1959.

6. McGuinness, C.L. "Geology and Ground-Water Resources of Puerto Rico." Economic Geology 42 (1947), p. 563-571.

7. Monroe, W.H. Geologic Map of the Carolina Quadrangle, Puerto Rico. U.S. Geological Survey, Map I-1054, 1977.

8. Muniz Air National Guard Base Comprehensive Land Development Study/Master Plan, Basora and Rodriguez, Engineers-Architects-Planners, 1986.

9. National Oil and Hazardous Substances Contingency Plan, 47 Federal Register 31224-31235, 16 July 1982.

10. Pease, M.H. Geologic Map of the San Juan Quadrangle, Puerto Rico. U.S. Geological Survey, Map I-1010, 1977.

11. Roberts, R.C. Soil Survey of Puerto Rico. U.S. Department of Agriculture, Bureau of Plant Industry, 1942.

APPENDIX A

Resumes of HMTC Preliminary Assessment Team

JANET SALYER EMRY

EDUCATION

M.S., geology, Old Dominion University, 1987
B.S. (cum laude), geology, James Madison University, 1983

EXPERIENCE

Three years' technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis.

EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Projects are for the U.S. Air Force and Air National Guard Installation Restoration Program.

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., Mechanical Engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Thirty-one years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

<u>Dynamac Corporation (1986-present)</u>: Program Manager/Department Manager

Responsible for activities relating to Preliminary Analysis, Site Investigations, Remedial Investigations, Feasibility Studies, and Remedial Action for the Installation Restoration Program for the U.S. Air Force, Air National Guard, Bureau of Prisons, and the U.S. Coast Guard, including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; preparation of Air Force Installation Restoration Program Management Guidance; and preparation of Part B permits.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

NATASHA M. BROCK

EDUCATION

Graduate work, civil/environmental engineering, University of Maryland, 1987-present

Graduate work, civil/environmental engineering, University of Delaware, 1985-1986

B.S. (cum laude), environmental science, University of the District of Columbia, 1984

Undergraduate work, biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Three years' experience in the environmental and hazardous waste field. Work performed includes remedial investigations/feasibility studies, RCRA facility assessments, comprehensive monitoring evaluations, and remedial facility investigations. Helped develop and test biological and chemical processes used in minimization of hazardous and sanitary waste generation. Researched multiple substrate degradation using aerobic and anaerobic organisms.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in determining rates and extent of contamination, recommending groundwater monitoring procedures, and soil sampling and analysis procedures. In the process of preparing standard operating procedure manuals for quick remedial response to site spills and releases, and PA/RI/FS.

C.C. Johnson & Malhotra, P.C. (1986-1987): Environmental Scientist

Involved as part of a team in performing Remedial Investigations/Feasibility Studies (RI/FS) for EPA Regions I and IV under Resource Conservation and Recovery Act (RCRA) work assignments for REM II projects. Participated on a team involved in RCRA Facility Assessments (RFAs), Comprehensive Monitoring Evaluations (CMEs), and Remedial Facility Investigations (RFIs) for EPA work assignments under RCRA for REM III projects in Regions I and IV. Work included solo oversight observations of field sampling and facility inspections. Additional responsibilities included promotion work, graphic layout, data entry-quality check for various projects. Certified Health & Safety Training Level C.

Work Force Temporary Services (1985-1986): Research Scientist

In working for DuPont's Engineering Test Center, helped in the development and testing of laboratory-scale biological and chemical processes for a division whose main purpose was to reduce the amount of hazardous waste generated. Also worked for Hercules, Inc., with a group involved in polymer use for wastewater treatment for clients in various industrial fields. Specifically involved in product consultation, troubleshooting, and product development.

National Oceanic and Atmospheric Administration (1982-1984): Research Assistant

Involved with an information gathering and distribution center of weather impacts worldwide. Specifically involved in data collection, distribution of data to clients, assessment production and special reports.

MARK D. JOHNSON

EDUCATION

B.S., Geology, James Madison University, 1980

EXPERIENCE

Eight years' technical and management experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance, preparation of statements of work for environmental field monitoring and feasibility studies for the Air Force and the Air National Guard, development of environmental field monitoring programs, and preparation of Preliminary Assessments for the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Senior Staff Scientist/Geologist

Primarily responsible for developing and managing technical support programs relevant to CERCLA related activities for the Air Force, Air National Guard, Department of Justice and Coast Guard. These activities include Statements of Work for Site Investigations (SI), Remedial Investigations (RI), and Feasibility Studies (FS); assessing groundwater at hazardous waste disposal/spill sites for the purpose of determining rates and extents of contaminant migration and for developing SI and RI programs and identifying remedial actions; reviewing SI, RI and FS contractor work plans for various government clients, developing technical and contractual requirements for SI, RI and FS projects, managing the development and preparation of Preliminary Assessments, and assisting clients in the development of their environmental management programs, which included preparation of the Air Force's Installation Restoration Program Management Guidance document.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL CREDENTIALS

Registered Professional Geologist, South Carolina, #116, 1987

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers

APPENDIX B

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. National Oceanic and Atmospheric Administration
   6001 Executive Boulevard
   Rockville, Maryland 20853

2. U.S. Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092

3. U.S. Fish and Wildlife Service
   U.S. Department of the Interior
   Washington, DC 20250

4. U.S. Soil Conservation Service
   U.S. Department of Agriculture
   Washington, DC 20250

APPENDIX C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Preliminary Assessment phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contaminant migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site the the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three stages. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; pro served areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)	S = Suspected confidence level
o Verbal reports from interviewer (at least 2) or written information from the records	o No verbal reports or conflicting verbal reports and no written information from the records
o Knowledge of types and quantities of wastes generated by shops and other areas on base	Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200° F	Flash point at 140° F to 200° F	Flash point at 80° F to 140° F	Flash point less than 80° F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS -Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
	L	S	M
50	L	C	L
	M	S	H
	S	C	M
	S	S	H
40	M	S	M
	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
70	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Multiply Point Rating Persistence Criteria	From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground Water Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground Water Contamination -Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: *If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.*

APPENDIX D

Site Factor Rating Criteria and Hazardous Assessment Rating Forms

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of sites:	Greater than 100	3
Distance to nearest well:	Greater than 3 miles	0
Land use/zoning within 1 mile radius:	Commercial/Industrial	2
Distance to Base boundary:		
Site No. 1	540 feet	3
Site No. 2	250 feet	3
Site No. 3	350 feet	3
Site No. 4	100 feet	3
Site No. 5	90 feet	3
Site No. 6	Immediately adjacent	3
Site No. 7	750 feet	3
Site No. 8	30 feet	3
Site No. 9	80 feet	3
Site No. 10	260 feet	3
Critical environments within 1 mile:	Major wetland/habitat of endangered species	3
Water quality of nearest surface water body:	Recreation	1
Groundwater use of uppermost aquifer:	Not used	0
Population served by surface water supply within 3 miles downstream of site:	None	0
Population served by groundwater supply within 3 miles of site:	None	0

2. WASTE CHARACTERISTICS CATEGORY		
Quantity:		
Site No. 1	45,000 gallons	L
Site No. 2	less than 5 tons	S
Site No. 3	2,200 gallons	M
Site No. 4	less than 1,100 gallons	S
Site No. 5	between 1,100 and 4,675 gallons	M

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGORY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Quantity (Continued):		
Site No. 6	between 1,100 and 4,675 gallons	M
Site No. 7	less than 1,100 gallons	S
Site No. 8	less than 1,100 gallons	S
Site No. 9	less than 1,100 gallons	S
Site No. 10	less than 1,100 gallons	S
Confidence Level:		
Site No. 1	Confirmed	C
Site No. 2	Confirmed	C
Site No. 3	Confirmed	C
Site No. 4	Confirmed	C
Site No. 5	Confirmed	C
Site No. 6	Confirmed	C
Site No. 7	Confirmed	C
Site No. 8	Confirmed	C
Site No. 9	Confirmed	C
Site No. 10	Suspected	S
Hazard Rating:		
Toxicity		
Site No. 1	Sax Level 3	3
Site No. 2	Not applicable	-
Site No. 3	Sax Level 3	3
Site No. 4	Sax Level 3	3
Site No. 5	Sax Level 3	3
Site No. 6	Sax Level 3	3
Site No. 7	Sax Level 3	3
Site No. 8	Sax Level 3	3
Site No. 9	Sax Level 3	3
Site No. 10	Sax Level 3	3

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGOARY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Hazard Rating: (Continued)		
Ignitability		
Site No. 1	Flash point -10°F to 30°F	3
Site No. 2	Not applicable	-
Site No. 3	Flash point 95°F to 145°F	2
Site No. 4	Flash point 95°F to 145°F	2
Site No. 5	Flash point 95°F to 145°F	2
Site No. 6	Flash point 95°F to 145°F	2
Site No. 7	Flash point 100°F to 110°F	2
Site No. 8	Flash point -50°F to 100°F	3
Site No. 9	Flash point 95°F to 145°F	2
Site No. 10	Flash point 100°F	2
Radioactivity		
Site No. 1	At or below background levels	0
Site No. 2	1 to 3 times background levels	1
Site No. 3	At or below background levels	0
Site No. 4	At or below background levels	0
Site No. 5	At or below background levels	0
Site No. 6	At or below background levels	0
Site No. 7	At or below background levels	0
Site No. 8	At or below background levels	0
Site No. 9	At or below background levels	0
Site No. 10	At or below background levels	0
Persistance Multiplier		
Site No. 1	Straight chain hydrocarbons	0.8
Site No. 2	Metals	1.0
Site No. 3	Straight chain hydrocarbons	0.8
Site No. 4	Straight chain hydrocarbons	0.8
Site No. 5	Straight chain hydrocarbons	0.8
Site No. 6	Straight chain hydrocarbons	0.8
Site No. 7	Straight chain hydrocarbons	0.8
Site No. 8	Straight chain hydrocarbons	0.8
Site No. 9	Straight chain hydrocarbons	0.8
Site No. 10	Straight chain hydrocarbons	0.8

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. WASTE CHARACTERISTICS CATEGORY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Hazard Rating: (Continued)		
Physical State Multiplier		
Site No. 1	Liquid	1.0
Site No. 2	Solid	0.5
Site No. 3	Liquid	1.0
Site No. 4	Liquid	1.0
Site No. 5	Liquid	1.0
Site No. 6	Liquid	1.0
Site No. 7	Liquid	1.0
Site No. 8	Liquid	1.0
Site No. 9	Liquid	1.0
Site No. 10	Liquid	1.0

3. PATHWAYS CATEGORY

Surface Water Migration

Distance to nearest surface water:		
Site No. 1	50 feet	3
Site No. 2	250 feet	3
Site No. 3	320 feet	3
Site No. 4	40 feet	3
Site No. 5	25 feet	3
Site No. 6	0 feet	3
Site No. 7	30 feet	3
Site No. 8	40 feet	3
Site No. 9	100 feet	3
Site No. 10	75 feet	3
Net precipitation:	Negative 22.6 inches/year	0
Surface erosion:	Slight	1
Surface permeability:	Up to 1.41 x 10^{-3} cm/sec	1

156th Tactical Fighter Group
Puerto Rico Air National Guard
Luis Munoz Marin International Airport
San Juan, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. WASTE CHARACTERISTICS CATEGORY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Rainfall intensity:	10.55 inches	3
Flooding:	In 100-year floodplain	1
Groundwater Migration		
Depth to groundwater:	5 feet to 8 feet	3
Net precipitation:	Negative 22.6 inches/year	0
Soil permeability:	Up to 1.41 x 10^{-3} cm/sec	2
Subsurface flow:	Occasionally sub-merged	1
Direct access to groundwater:	No evidence of risk	0

4. WASTE MANAGEMENT PRACTICES CATEGORY

Practice:

Site No. 1	No containment	1.0
Site No. 2	No containment	1.0
Site No. 3	Limited containment	0.95
Site No. 4	No containment	1.0
Site No. 5	No containment	1.0
Site No. 6	No containment	1.0
Site No. 7	No containment	1.0
Site No. 8	No containment	1.0
Site No. 9	No containment	1.0
Site No. 10	No containment	1.0

140th Air Control and Warning Squadron
Puerto Rico Air National Guard
Toa Baja, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of sites:	1 to 25	1
Distance to nearest well:	Greater than 3 miles	0
Land use/zoning within 1 mile radius:	Residential	3
Distance to Base boundary:	Less than 1,000 feet	3
Critical environments within 1 mile:	Natural areas	1
Water quality of nearest surface water body:	Recreation	1
Groundwater use of uppermost aquifer:	Not used	0
Population served by surface water supply within 3 miles downstream of site:	None	0
Population served by groundwater supply within 3 miles of site:	None	0

2. WASTE CHARACTERISTICS CATEGORY

Quantity:

Site No. 1	Less than 1,100 gallons	S
Site No. 2	20 to 25 gallons	S
Site No. 3	Less than 1,100 gallons	S

Confidence Level:

Site No. 1	Suspected	S
Site No. 2	Confirmed	C
Site No. 3	Suspected	S

140th Air Control and Warning Squadron
Puerto Rico Air National Guard
Toa Baja, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGORY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Toxicity		
Site No. 1	Sax Level 2	2
Site No. 2	Sax Level 3	3
Site No. 3	Sax Level 3	3
Ignitability		
Site No. 1	Flash point 140°F to 200°F	1
Site No. 2	Flash point 140°F to 200°F	1
Site No. 3	Flash point -50°F to 100°F	3
Radioactivity	At or below background levels	0
Persistance Multiplier		
Site No. 1	Straight chain hydrocarbons	0.8
Site No. 2	Straight chain hydrocarbons	0.8
Site No. 3	Straight chain hydrocarbons	0.8
Physical State Multiplier		
Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0
Site No. 3	Liquid	1.0

3. PATHWAYS CATEGORY

Surface Water Migration

Distance to nearest surface water:	Less than 500 feet	3

140th Air Control and Warning Squadron
Puerto Rico Air National Guard
Toa Baja, Puerto Rico

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. WASTE CHARACTERISTICS CATEGORY (Cont'd)	RATING SCALE LEVELS	NUMERICAL VALUE
Surface Water Migration (Continued)		
Net precipitation:	Less than negative 10 inches/year	0
Surface erosion:	Severe	3
Surface permeability:	4.45×10^{-4} cm/sec to 1.41×10^{-3} cm/sec	1
Rainfall intensity:	Greater than 3 inches	3
Flooding:	In 100-year floodplain	1
Groundwater Migration		
Depth to groundwater:	Less than 10 feet	3
Net precipitation:	Less than negative 10 inches/year	0
Soil permeability:	4.45×10^{-4} cm/sec to 1.41×10^{-3} cm/sec	2
Subsurface flow:	Bottom of site occasionally submerged	1
Direct access to groundwater:	No evidence of risk	0

4. WASTE MANAGEMENT PRACTICES CATEGORY

Practice:

Site No. 1	No containment	1.0
Site No. 2	No containment	1.0
Site No. 3	No containment	1.0

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE JP-4 SPILL AREA (SITE 1)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE 18 NOVEMBER 1972
OWNER/OPERATOR 156TH TFG, SAN JUAN, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
	SUBTOTALS			72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (L)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (100)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(100)(0.8) = (80)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(80)(1) = (80)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(80)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(67)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR	=	FINAL SCORE
(67) x	(1)	=	67

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE AIRCRAFT BURIAL AREA (SITE 2)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE JANUARY 1981
OWNER/OPERATOR 156TH TFG, SAN JUAN, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (L)

FACTOR SUBSCORE A (30)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(30)(1) = (30)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(30)(0.5) = (15)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(15)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(45)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR	=	FINAL SCORE
(45)	(1)	=	45

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE — UNDERGROUND JP-5 FUEL LINE LEAK (SITE 3)
LOCATION — PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE — 27 NOVEMBER TO 4 DECEMBER 1981
OWNER/OPERATOR — 156TH TFG, SAN JUAN, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY — HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
SUBTOTALS				72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (M)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (80)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(80)(0.8) = (64)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(64)(1) = (64)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <80 OR LESS> EXISTS, PROCEED TO B.

(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(64)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(61)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
61)(	0.95)	=	58

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE UNDERGROUND WASTE OIL TANK (SITE 4)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE 1982 TO PRESENT
OWNER/OPERATOR 156TH TFG, SAN JUAN, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(56)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(56)	(1)	=	56

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE CORROSION CONTROL HANGAR (SITE 5)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE 1982 TO PRESENT
OWNER/OPERATOR 156TH TFG, SAN JUAN, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (M)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (80)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(80)(0.8) = (64)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(64)(1) = (64)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(64)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(61)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(61)	(1)	=	61

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	POL FACILITY DRAINAGE (SITE 6)
LOCATION	PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE	1976 TO PRESENT
OWNER/OPERATOR	156TH TFG, SAN JUAN
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (M)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (80)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(80)(0.8) = (64)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(64)(1) = (64)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(64)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(61)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(61)	(1)	=	61

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ALERT HANGAR (SITE 7)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE
OWNER/OPERATOR 156TH TFG, SAN JUAN
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
	SUBTOTALS			72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(56)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(56)	(1)	=	56

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE MOTOR POOL (SITE 8)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE
OWNER/OPERATOR 156TH TFG, SAN JUAN
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(56)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE	x	WASTE MANAGEMENT PRACTICES FACTOR	x		FINAL SCORE
(56)	x	(1)		=	56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE TRIM PAD (SITE 9)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE 1976 TO PRESENT
OWNER/OPERATOR 156TH TFG, SAN JUAN
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(56)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(56)	(1)	=	56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ABANDONED UNDERGROUND STORAGE TANK (SITE 10)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE 1964 TO 1966
OWNER/OPERATOR 156TH TFG, SAN JUAN
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	3	10	30	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		72	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 40

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (S)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (40)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(40)(0.8) = (32)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(32)(1) = (32)

III. PATHWAY

RATING FACTOR		RATING	FACTOR MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				62	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					57

2. FLOODING

FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(57)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(40)
WASTE CHARACTERISTICS	(32)
PATHWAYS	(57)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(43)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(43)(	1)	=	43
			=========

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	WASTE OIL PIT (SITE 1)
LOCATION	PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE	UNTIL 1985
OWNER/OPERATOR	140TH ACWS, TOA BAJA, PUERTO RICO
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	1	4	4	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	1	10	10	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
	SUBTOTALS			47	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 26

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (S)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (M)

FACTOR SUBSCORE A (30)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(30)(0.8) = (24)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(24)(1) = (24)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <80 OR LESS> EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	3	8	24	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				78	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					72

2. FLOODING

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(26)
WASTE CHARACTERISTICS	(24)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(43)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x	FINAL SCORE
(43)	(1)	= 43

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	PCB TRANSFORMER OIL DUMP (SITE 2)
LOCATION	PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE	1964 TO PRESENT
OWNER/OPERATOR	140TH ACWS, TOA BAJA, PUERTO RICO
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	1	4	4	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	1	10	10	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		47	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 26

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <80 OR LESS> EXISTS, PROCEED TO B.
(80)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	3	8	24	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				78	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					72

2. FLOODING

2. FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(26)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(51)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(51)	(1)	=	51

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ABANDONED UNDERGROUND STORAGE TANKS (SITE 3)
LOCATION PUERTO RICO AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE
OWNER/OPERATOR 140TH ACWS, TOA BAJA, PUERTO RICO
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	1	4	4	12
B. DISTANCE TO NEAREST WELL	:	0	10	0	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	1	10	10	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	0	9	0	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	0	6	0	18
		SUBTOTALS		47	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 26

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (S)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (40)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(40)(0.8) = (32)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(32)(1) = (32)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	3	8	24	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	3	8	24	24
SUBTOTALS				78	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					72

2. FLOODING		1	1	1	3
SUBSCORE (100 x FACTOR SCORE /3)	:				33

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(72)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(26)
WASTE CHARACTERISTICS	(32)
PATHWAYS	(72)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(43)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(43)	(1)	=	43

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APPENDIX E

Underground Storage Tank Inventory

Underground Storage Tank Inventory

	TANK IDENTIFICATION NUMBER 1	2	3	4	5	6	7
Location	Corrosion Control Hangar (West)	Corrosion Control Hangar (East)	Motor Pool	Motor Pool	Motor Pool	Disaster Prepared-ness Office	Avionics
Capacity (gallons)	300	950	1,775	2,000	3,000	500	280
Contents	Waste Oil	Waste Oil	Diesel Fuel	Unleaded Gasoline	Leaded Gasoline	Diesel Fuel	Diesel Fuel
Year Installed	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Material of Construction	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Coatings A. Interior B. Exterior	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown
Cathodic Protection	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Piping	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	In Use	In Use	In Use

Underground Storage Tank Inventory (Continued)

	TANK IDENTIFICATION NUMBER 8	9	10	11	12	13	14
Location	MSS/CC	Alert Hangar	Operations	Pass & ID Building	Main Hangar (West)	140th ACWS Radar Tower	140th ACWS Radar Tower
Capacity (gallons)	2,000	1,100	550	280	1,000	1,500	1,500
Contents	Diesel Fuel	Diesel Fuel	Diesel Fuel	Diesel Fuel	Diesel Fuel	Diesel Fuel	Leaded Gasoline
Year Installed	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Material of Construction	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Coatings A. Interior B. Exterior	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown	A. Unknown B. Unknown
Cathodic Protection	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Piping	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	Not In Use (date unknown)	Not In Use (date unknown)	Not In Use (date unknown)